PATENT SPECIFICATION 576,623

Application Date: April 6, 1943. No. 5495/43.

Complete Specification Accepted: April 12, 1946.

(Under this application, which was originally made under Section 91 of the Patents and Designs Acts, 1907 to 1942, a Specification was laid open to public inspection on Nov. 8, 1943.)

COMPLETE SPECIFICATION

Electromagnetic Relays

I, WILLIAM WARREN TRIGGS, a member of the firm of Marks & Clerk, of 57 and 58, Lincoln's Inn Fields, London, W.C.2, a British Subject, do hereby declare the nature of this invention (a communication to me from abroad by Pan A.-G., a joint-stock Company duly organized under the laws of Switzerland, residing at Glarus, Switzerland) and in what manner the same is to be performed, to be particularly described and ascertained in and by the following statement:—

This invention relates to electromagnetic relays and more particularly to relays comprising a plurality of magnets of similar construction, each magnet controlling a contact or contacts but some contacts or contact sets being common to two or more magnets, the armatures of the individual magnets having means for influencing contacts of other magnets.

The invention is characterised in that for influencing the contacts an insulating plate-like member extends laterally from each armature, the contacts being disposed parallel to the axis or cores of the magnets, and the armatures being substantially parallel with the cores and carrying out movements substantially perpendicular to the cores.

With this device the solution of different connecting problems has become much simpler than before, when many contacts were necessary. For the same problem much fewer contacts are needed and in this way the working reliability is increased. Besides this, the expenses for material and erecting are reduced.

The accompanying drawings illustrate, by way of example, different embodiments of the object of the invention.

Figure 1 is a side view of a contact device with six electromagnetic systems, which, in

Figure 2 are shown in plan view.

Figure 3 is a section along the line III—III in Figure 2.

Figure 4 is a section along the line IV—IV in Figure 2.

Figure 5 is a side view seen in the direction of the arrow V in Figure 2.

Figure 6 represents a schematic illustration of the contacts present in the device shown and their manner of operation.

Figure 7 is a diagram of connections which can be obtained by the contact device shown in Figure 8.

Figures 9 and 10 are diagrams showing certain possibilities of use of a contact device according to the invention.

Figures 11—13 show three other examples of connection.

Referring now to Figs. 1 to 6, 1 is a base plate on which the whole device is mounted. The single magnetic systems of all the illustrated relays are exactly equal and independent of one another. Their core 2 is slotted at the bottom; the two halves 3 are bent along different directions in order to form a foot. The cores 2 are fixed to the base plate 1 by means of the screws 9. Below the coil 4 there is a carrier member 5 to which the blades 6 of the set of contacts are fixed. Their tongues 7 project below out of the base plate 1. The soldered junctions of the coil winding are designated by 8.

Pointed screws 11 enter into notches of the core 2. They pass laterally through the lower part of the armature 12, can be adjusted by lock nuts, and form the support of the armature 12. This latter is substantially parallel to the core 2 of the coil and has a head 13 carrying a stop 14. The amplitude of the armature movement can be adjusted by means of a screw 15. The whole armature construction is arranged in such a way that the weight of the armature presses the stop 14 against the upper part of the magnet core 2. If necessary the effect of the armature weight can be assisted by an initial tension in the springs or blades 6 of the set of contacts.

The blades 6 are longer than the electromagnetic system 2, 4, 12. In this way it is possible to render the contact making independent of the place of operation of the blades.

The armatures 12 carry different plates 16 of insulating material which operate, i.e. open or close the contacts (fixed to the blades) either directly or by means of loops, bars, etc. These plates 16 are of different shapes. According to the purpose desired, they extend within reach of

[*Price* 1/-]

different sets of contacts and at the same time operate several contacts. They may also take one another along or lock one another mechanically either direct or indirect, e.g., by special parts of the plates themselves. As may be seen in Fig. 1 the plates 16 may be arranged at different heights without modifying the coil construction, merely by fixing them above or under the head 13 of the armature 12.

The different sets of contacts and the plates 16 operating them and present in the device shown in Figs. 1 to 5 are schematically illustrated in Fig. 6. The plates are designated by 16A—16F in correspondence with the relays A, B, C, D, E and F of Fig. 2 and, on attraction of the armature, are moved in a direction indicated by arrows.

The sets of contacts *a* belong to the relay A, the sets of contacts *b* to the relay B etc.

As may be seen in Fig. 6, upon excitation of relay A, the plate 16A closes the contacts a_1 and a_3 direct, however, it opens the contact a_2 which, by a bar 20, is brought within the sphere of action of the plate 16A, closes simultaneously the contacts b_1 and b_2 (the latter by means of a loop 21) and, furthermore, by means of a rod 18 carrying the insulating member 19, the plate 16A closes the contact c_1 and opens the contact c_2; the one blade of the latter carrying a loop 22 which reaches within the sphere of action of the insulating member 19.

On attraction of the armature of the relay B, the plate 16B closes the contacts a_1, b_1 and b_2 and opens the contact b_3. The plate 16B, however, is without influence upon the contact a_2, the bar 20 being outside the sphere of action of plate 16B.

On attraction of the armature of the relay C, the plate 16C closes direct the contacts c_1 and d_1, opens by means of the loop 23 the contact c_2 and, with a prominence 24, engages the bar 20 for opening the contact a_2. At the same time the plate 16C, by means of the bar 28, moves the blade d_2, in this way preparing closing of the contact d_2, e_1.

The plate 16D has a prominence 25 extending within reach of a projection 26 of the plate 16C, so that on operation of the plate 16D all the contacts lying in the sphere of action of the plate 16C are operated. Besides this, by means of the bar 27, the contact d_3 is opened and the contact d_4 closed.

The plate 16E acts upon the blade of contact e_1 and moves in the direction of the blades of the contacts d_2. For closing the contacts d_2, e_1 the attraction of the relays C and E or D and E is, therefore necessary. By means of the prominence 29 the relay E prevents the armature of relay F from moving when E is excited. If this is not the case, attraction of the armature of relay F causes by means of the bar 30 the opening of the contact f_1 and the closing of the contact f_2.

In this example it has been shown how sets of contacts, e.g. *a* and *b*, are influenced direct by different electromagnetic systems being independent of one another (the relays A, B and C).

An indirect operation of a set of contacts takes place when the plate of the relay D acts upon that of the relay C and a locking takes place when relay E is excited, for, in this case, excitation of the relay F is without effect. In this way, the armature of the relay E influences the contacts belonging to relay F.

Fig. 7 illustrates by way of example a simple connecting problem which can be solved with the relays H, J, K of Fig. 8 and a single contact. Hitherto three contacts *h*, *i*, *k* had to be closed with these three relays (Fig. 7). In the device according to the invention, however, the insulated plates 16K, 16H and 16J of the relays K, H and J act upon the blades of the single contact *l*. If the armature of relay K only is attracted *l* is closed, and when, after this, the armature of relay J is attracted the contact *l* is reopened, since the one initially tensioned blade of the contact follows the movement of plate 16J. When relay H is attracted this blade is brought back and the contact *l* is again closed. If K is opened both the excitation of relay H and that of relay J is without effect.

If one wishes to replace two contacts connected in parallel by a contact influenced by two relay armatures, both armatures are caused to act independent of one another upon the same contact blade so that both armatures are able to communicate the same movement. Then, on operation of a single armature, the contact is closed.

As shown in Fig. 11 the series connection of two contacts can likewise be replaced by a single contact 100 if one causes each of the two armatures N and O to act upon one blade of this contact 100 in opposite directions so that the electric connection is only perfect when both armatures N and O are attracted.

As shown in Fig. 12 the same result might also be obtained by giving the one blade of the contact 101 an initial tension so that it bears against both armatures P and Q of two relays. In this way each separate armature prevents contact making which is only performed when

both armatures P and Q are attracted.

As illustrated in Fig. 13, in the case of change-over contacts considerable saving is made by bringing the three blades 102, 103, 104 of the same under the influence of the armatures of different relays. If, for instance, as in this Fig. 13 two pairs of relays R, S, T, U are disposed in such a way that their heads are directed towards the middle of the whole arrangement, a single set of contacts can be easily influenced by four relays. On exciting relays R and S blade 102 approaches blade 103. Closing the contact 102, 103 may then be effected by exciting relay T. Blade 104 is caused to approach blade 103 by exciting relay U, to effect contact between them.

There are likewise no difficulties in coupling these four relays with other four relays so that the plates cooperate with the set of contacts in such a way that this single set of contacts can be influenced by a great number of circuits etc. The same can be attained by mutually coupling or locking the relay armatures in a suitable manner. In Fig. 9 it is shown how different kinds of connection can be obtained by a single contact. The arrows indicate the direction of movement of the armature on excitation of the relays. If the armatures of both relays are attracted smiultaneously, the condition shown will not be changed. This is also the case if the armature of relay M only is attracted. If relay L is excited the contact is closed. In this state the contact can be reopened by the relay M without the excitation being removed from relay L. If the circuits of the relays L and M are then interrupted, no change of the contact conditions takes place. The same connection possibilities can be obtained by arranging the relays as shown in Fig. 10.

Having now particularly described and ascertained the nature of my said invention, and in what manner the same is to be performed, I declare that what I claim is:—

1. Electromagnetic relays comprising a plurality of magnets of similar construction, each magnet controlling a contact or contacts but some contacts or contact sets being common to two or more magnets, characterised in that for influencing the contacts an insulating plate-like member extends laterally from each armature, the contacts being disposed parallel to the axis or cores of the magnets, and the armatures being substantially parallel with the cores and carrying out movements substantially perpendicular to the cores.

2. Electromagnetic relays, substantially as described with reference to the accompanying drawings.

Dated this 6th day of April, 1943.

MARKS & CLERK.

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576,623 COMPLETE SPECIFICATION

SHEET I

[This Drawing is a reproduction of the Original on a reduced scale.]

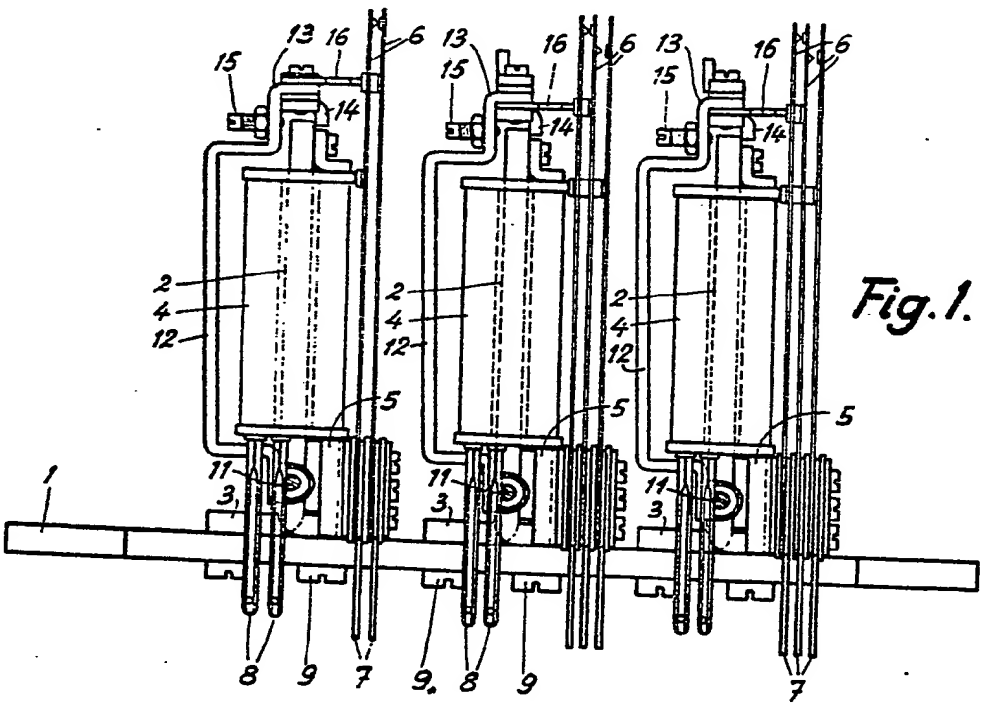


Fig. 1.

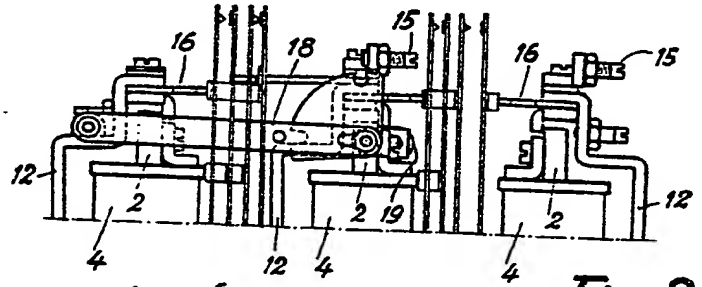


Fig. 3.

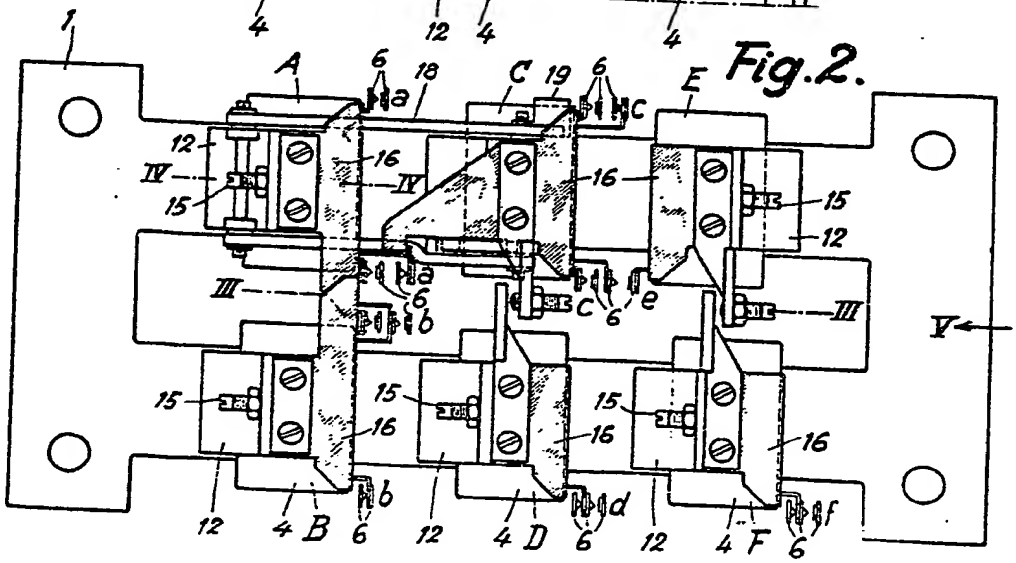


Fig. 2.

Fig.6.

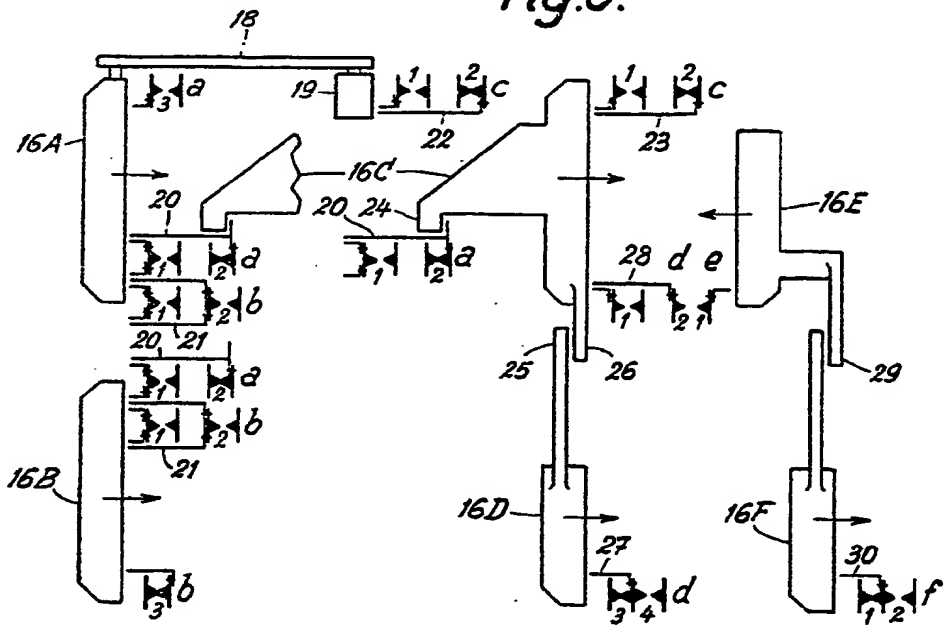


Fig.7.

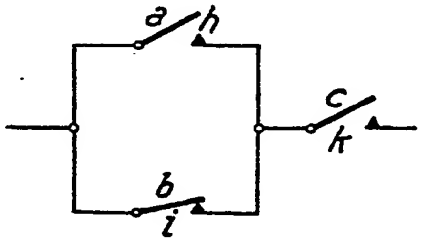


Fig.8.

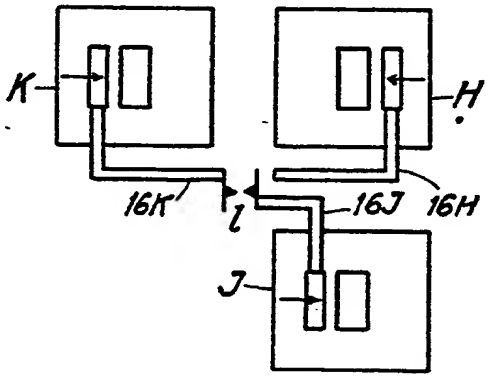


Fig.9.

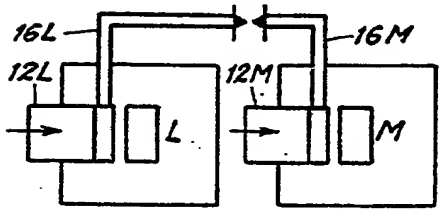
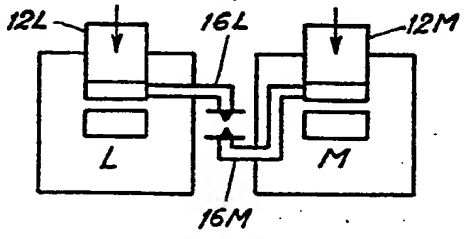


Fig.10.



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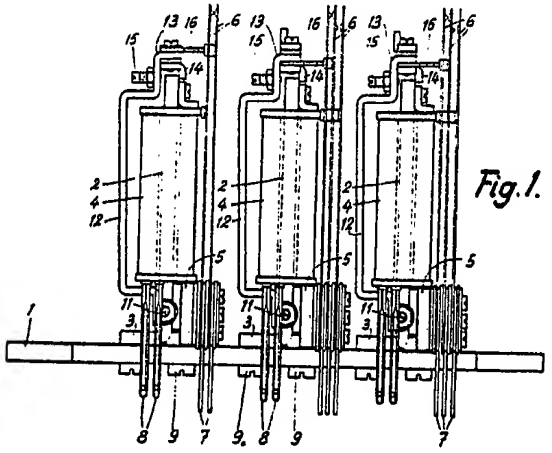

Fig.1.

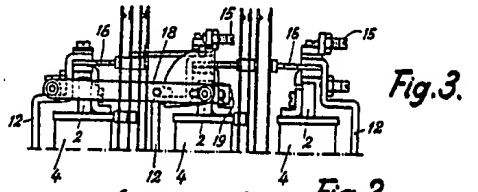

Fig.3.

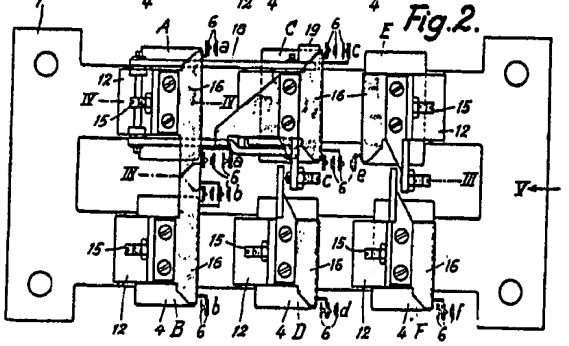

Fig.2.

Fig.6.

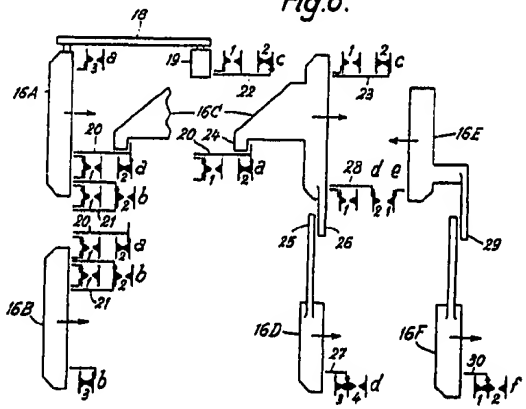

Fig.7.

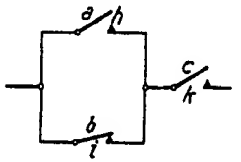

Fig.8.

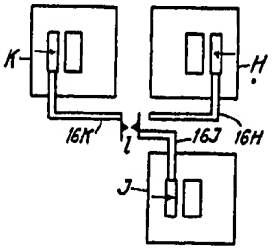

Fig.9.

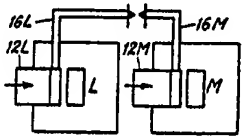

Fig.10.

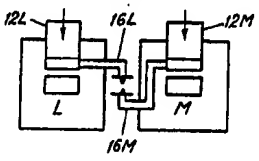

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Fig. 5.

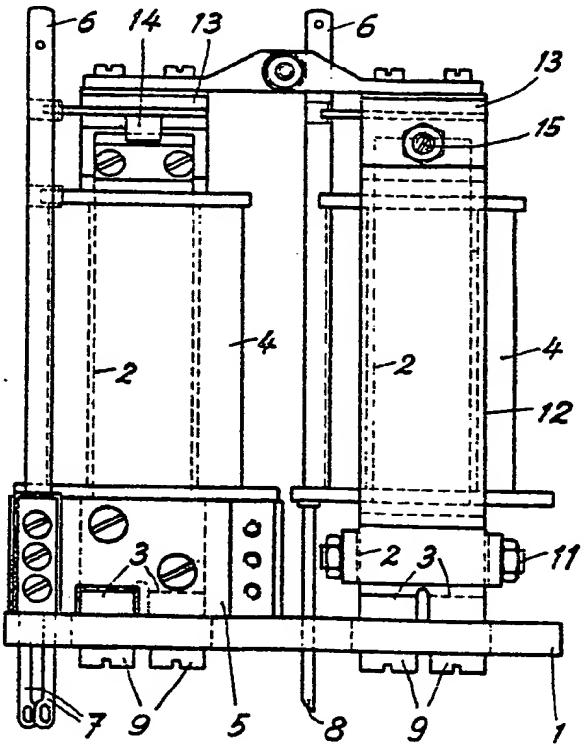
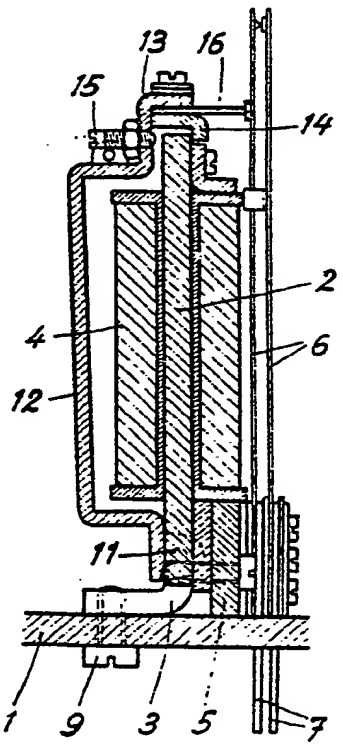


Fig. 4.



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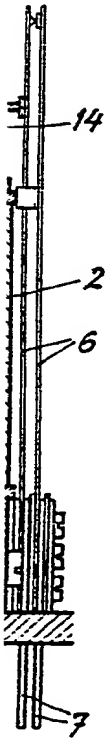

Fig. 11.

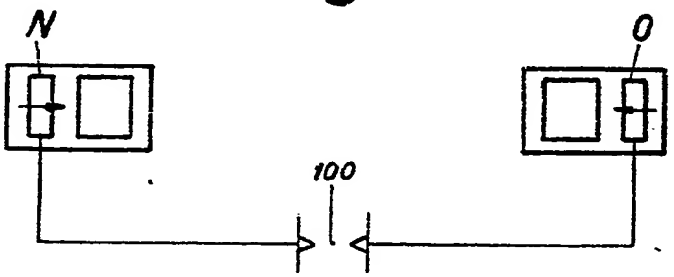

Fig. 12.

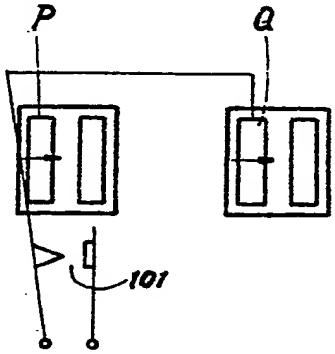

Fig. 13.

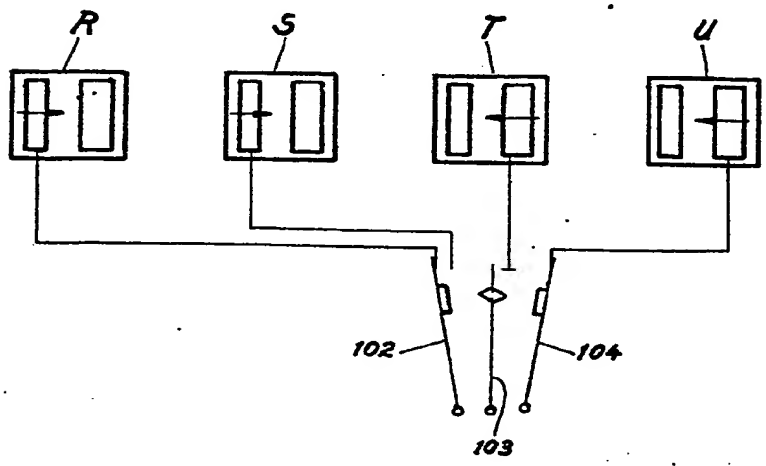

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Fig. 5.

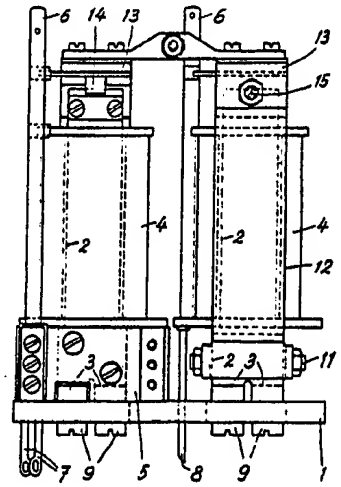


Fig. 4.

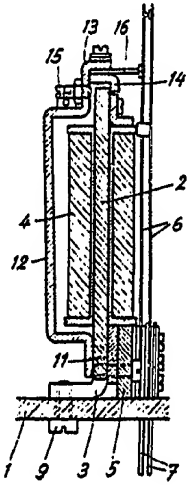


Fig. 11.

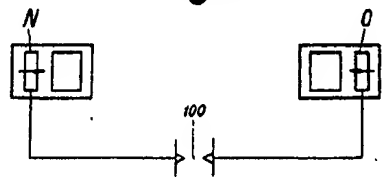
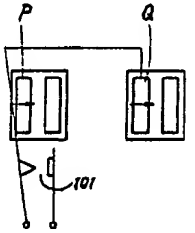


Fig. 12.



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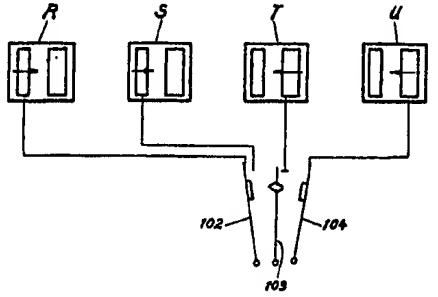

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